Project Planning at FNAL and BNL

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Long Baseline DUSEL
Collaboration Meeting

February 26, 2009

Topics

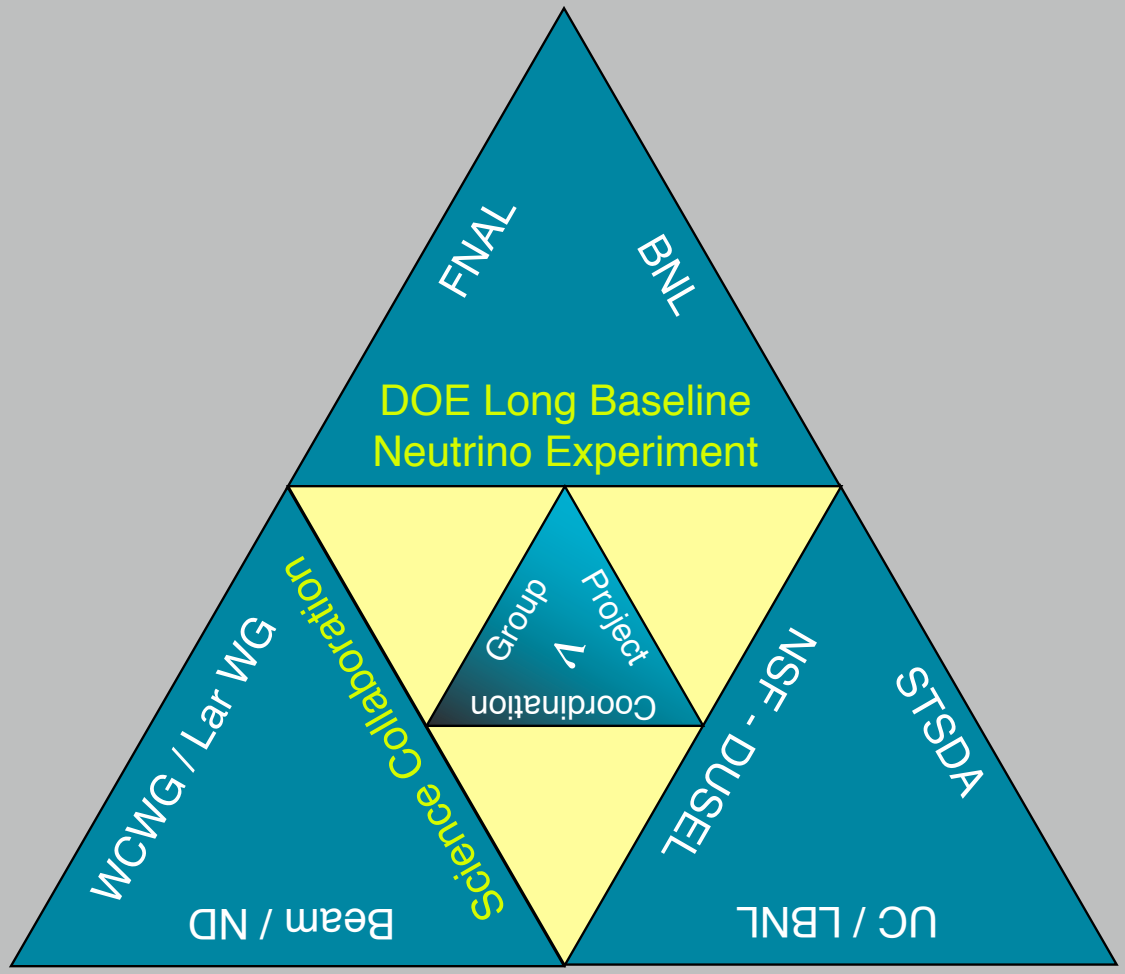
- Stakeholders
- Coordination
- Latest charge from DOE
- Project Organization
- Budget Status
- Manpower Status
- Issues
- Summary
- Discussion

Stakeholders

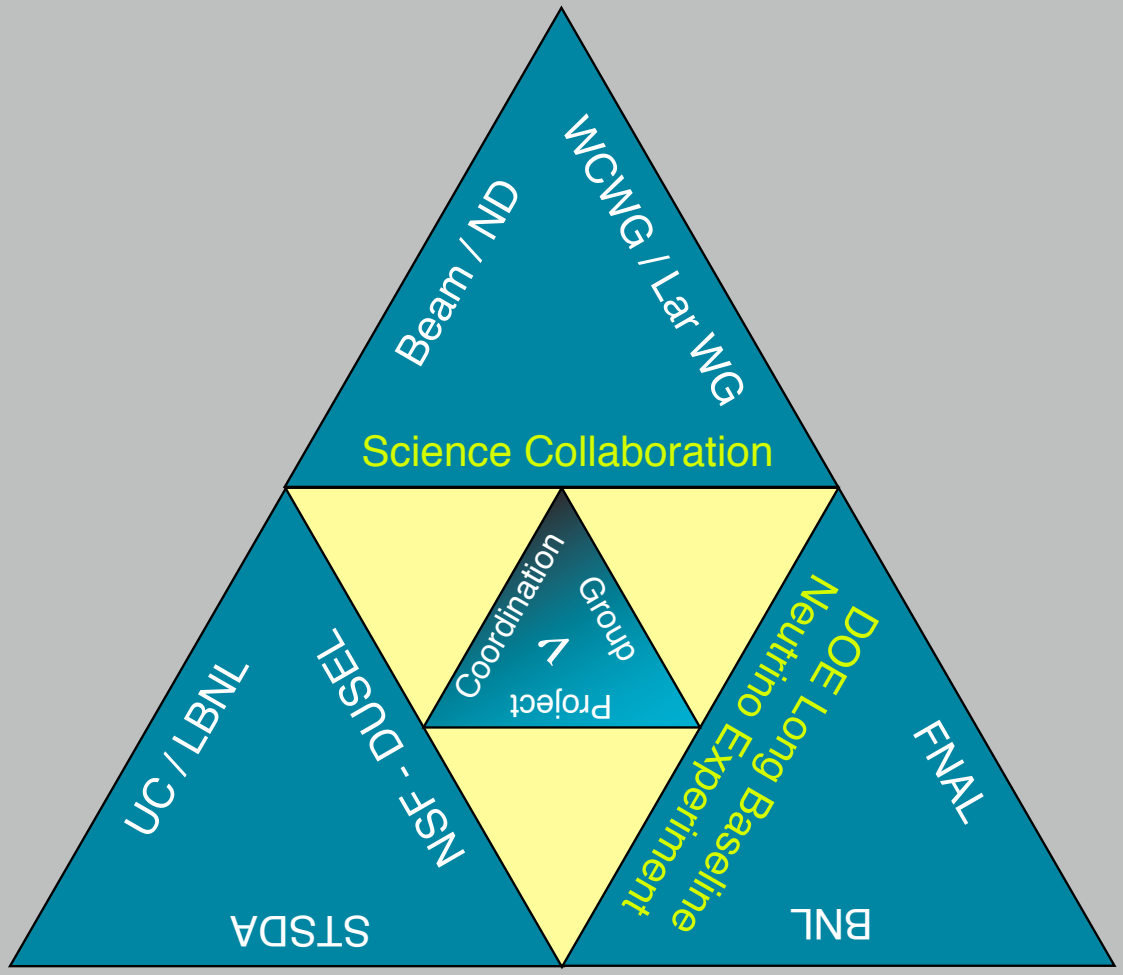
- This collaboration
- DUSEL at UC-LBNL
- SDSTA – Sandford Lab
- Fermilab
- Brookhaven

Over the past few months Laboratory management at FNAL-BNL-LBNL encouraged more coordination and interaction among all of the stakeholders;

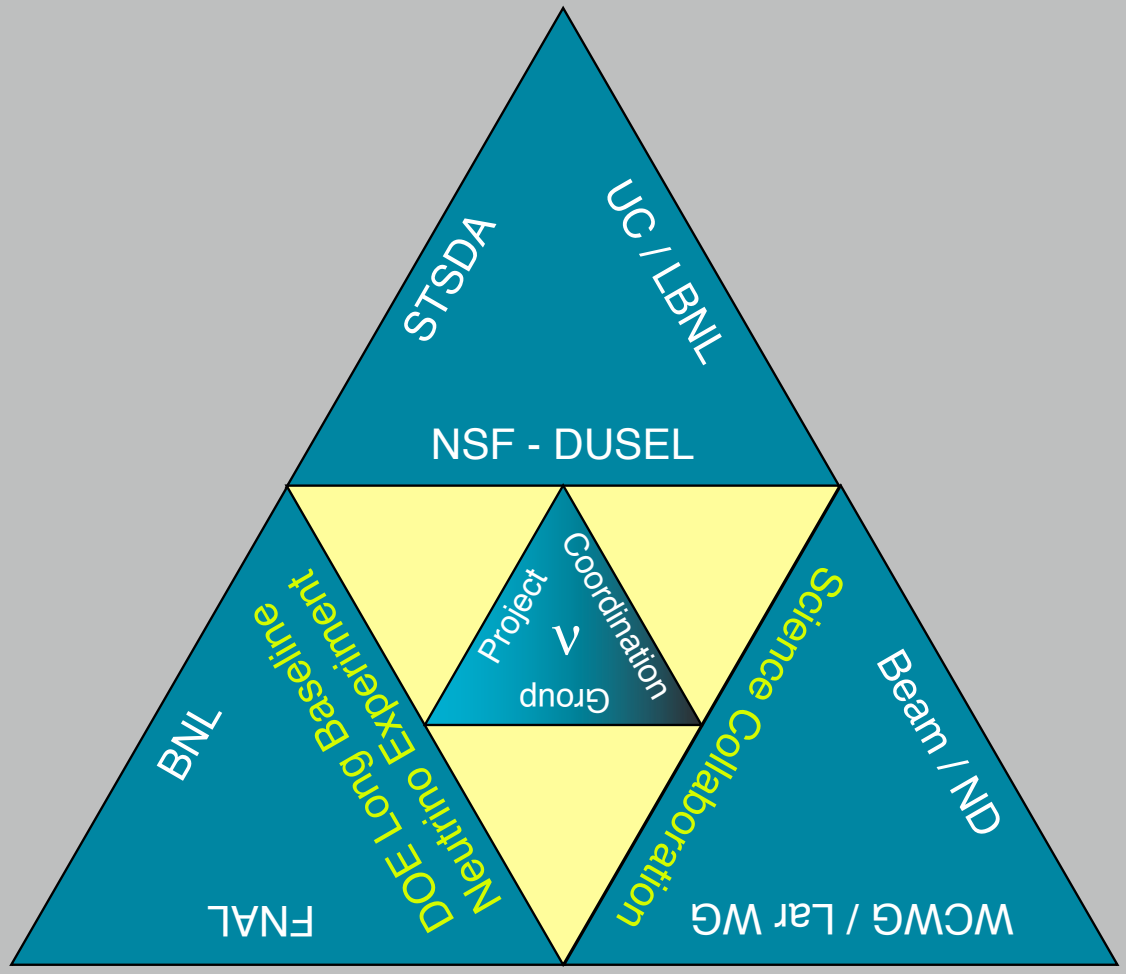
After a couple of iterations …..



Another view of Bob's Boxes
The Triangle Organization

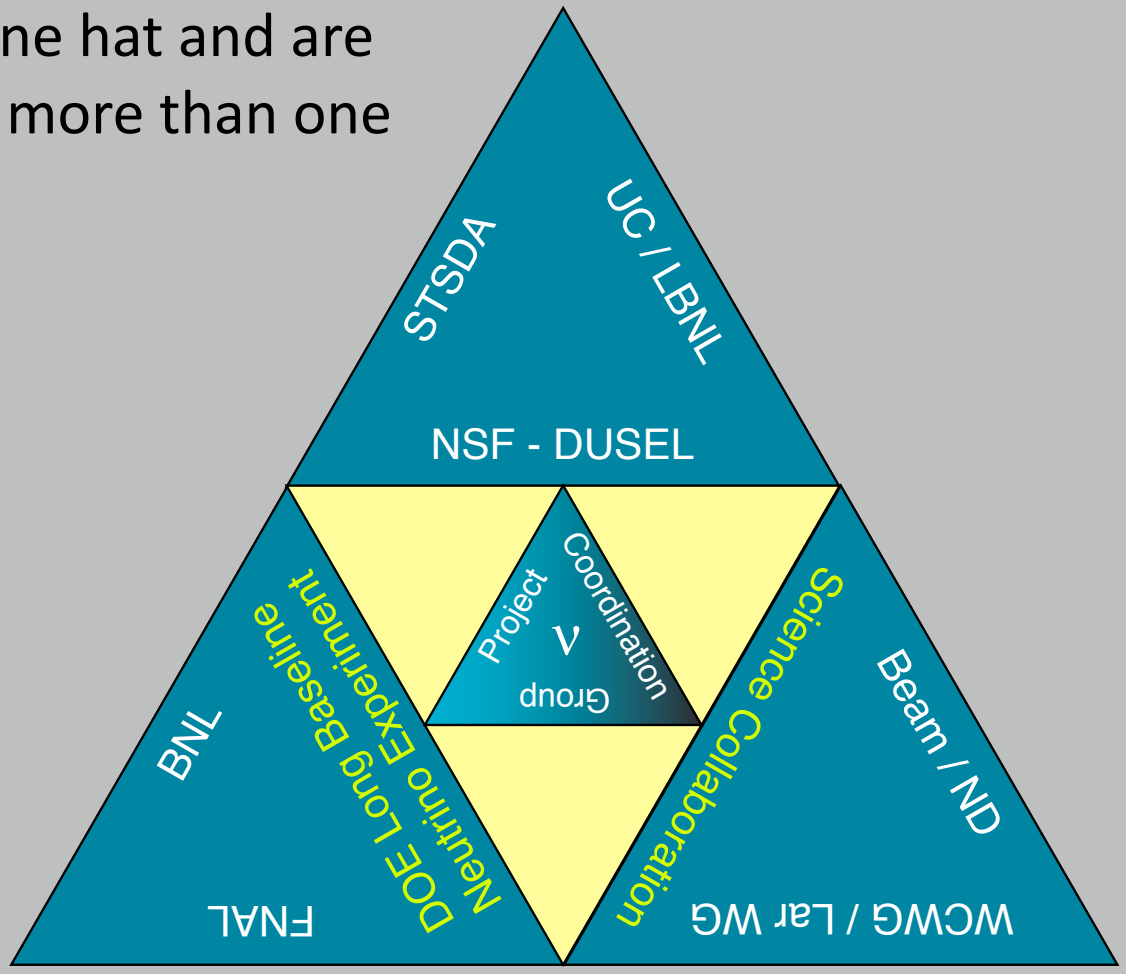


How you orient the triangle can depend on your point of view



One triangle with out the others doesn't end in a successful experiment

Note some people wear more than one hat and are members of more than one group



One triangle with out the others doesn't end in a successful experiment

Project Coordination Group

- Mission
  - Communication
  - Division of Responsibility
  - Coordination of Efforts
- Status
  - Need to identify members
  - Suggestion of a rotating chair
  - Start regular meetings

What BNL will do…

- 1) BNL will provide a Project Management team for the preparation of the Homestake Neutrino Detector design towards the goal of a DOE CD-1 decision on LBNE.
- 2) The BNL Project will report to the DOE LBNE Project at FNAL.
- 3) The BNL Project team will play the leading role on water Cherenkov detector design and costing. It will also contribute towards R&D on LAR issues necessary for consideration of technology choices at the CD-1 review.
- 4) The BNL team will coordinate extensively with the DUSEL facility project at UC/Berkeley on cavity design.
- 5) The BNL group will collaborate with FNAL on beam design.
- 6) The BNL group will collaborate with the science collaboration on the science and detector design issues.

From FNAL :

- 1. FNAL will provide a Project Management team to coordinate efforts towards the goal of a DOE CD-1 decision on the Long Baseline Neutrino Experiment (LBNE).

- 2. FNAL will provide a team to lead and coordinate the conceptual design efforts on a neutrino beam directed to the Homestake Mine and a near detector project.

- 3. FNAL Scientists will participate in the Science Collaboration, contributing to design efforts on the beam, water Cerenkov and liquid argon detectors and near detectors

To be added

- Bullets from Science Collaboration and DUSEL/ Sandford Lab

Establishing Project "Offices"

- What constitutes a Project Office?
  - People – not location
- Primary task for this stage of the Project is to **make a CD-1 Plan**
- Need to establish budgets and identify funding to pay for the work that needs to be done
- Administrative Support for
  - Processing requisitions and tracking Purchase Orders
  - Tracking expenditures and effort reports
  - Assist with meetings and travel
- At FNAL : Assume Project Office will be established in PPD
  - Until committed resources are assigned, we will need to rely on the PPD Office staff to set up budgets and provide the required administrative support
  - Will need to work out relationships with AD since resources for the Beam subproject will have to come from there.
- BNL has also started setting up (Milind/Ralph)

Where are we right now?

- DOE OHEP has prepared the "in house" documentation requesting CD-0 (Mission Need) for a Long Baseline Neutrino Experiment (LBNE)
- This documentation has not been made public yet
  - It proposes that the project will include a new neutrino beam aimed from Fermilab to a detector at a long baseline, a near detector at FNAL and a far detector
  - It should cost in the range of < $750M….
- When CD-0 is approved we move from the *Project Initiation Phase* to the *Project Definition Phase*
- We have been charged by the DOE to prepare a plan for achieving CD-1
  - Time scale : 1 – 2 years (max)
- We have not been asked to produce the detailed designs (yet)
- The first design we will need to produce is a Conceptual Design
  - This is achieved by defining requirements and evaluating alternatives

Latest charge from DOE

Scope of Work for LBNE CD1 Planning

We would like to see Fermilab and Brookhaven form a well integrated, effective team to **develop the CD1 documentation for a Long Baseline Neutrino Experiment (LBNE).** The LBNE is comprised of a neutrino beam line, a near detector, and a far detector. The target **time frame for completion of the CD1 documentation is the third quarter of FY 2010**.

Based on expertise, experience, and expressed interest we envision the following responsibilities. **Fermilab** will have overall responsibility for the **documentation**. In terms of major LBNE components, Fermilab has responsibility for the **beamline and the near detector**, while **Brookhaven has responsibility for the far detector**. **The two institutions should jointly develop a preliminary plan for CD1 documentation by March 16, 2009.**

As required, the CD1 documentation should include an alternatives analysis and cost range estimate. The analysis should be performed for source intensity and location; detector size, technology, location and depth; and operational scenarios for multi-detector, multi-location options. This is not meant to be an exhaustive list. The proposed plan should address management structure and personnel and resource requirements for completion of a CD1. **The institutions should propose a project structure which will efficiently and without duplication develop the CD1 documentation and which will ensure communications with the NSF sponsored DUSEL project and the self-organized large detector collaboration.** The proposal should list the type of personnel needed to complete CD1 documentation as well as the funds needed for contracts, travel, and appropriate short-term R&D. As we have discussed in the past, **should CD1 be granted for the LBNE, project management will necessarily require reassessment.**

CD-1 Requirements

The following list is a summary of the requirements provided in the DOE Order 413.3 pages 11 - 13 (dated 7-28-06). Many of these requirements will be carried out by DOE staff. Others will be done by the Project Team (Fermilab and collaborating institutions), and a few will be done jointly. Our current understanding of these responsibilities are listed next to each item.

1. Prepare a Conceptual Design Report - Project Team
2. Prepare an Acquisition Strategy - Project Team in consultation with DOE
3. Comply with the One-for-One Replacement legislation - Project Team in consultation with DOE
4. Prepare a Preliminary Project Execution Plan –DOE
5. Approve appointment of the Federal Project Director –DOE
6. Establish and charter an Integrated Project Team –DOE
7. Conduct a design review of the conceptual design - Project Team (preliminary), DOE
8. Prepare a Project Data Sheet - DOE
9. Approve long lead procurements (if necessary) – DOE
10. Implement Integrated Safety Management into management and work process planning - Project Team
11. Prepare environmental documents - Project Team
12. Prepare a Preliminary Security Vulnerability Assessment Report - Project Team
13. Determine that the Quality Assurance Program (institutional) is acceptable and continues to apply - Project Team and FNAL staff

Status of Budgets

- FY09 – Continuing resolution (M&S)
  - Beam Design : ~ $400 K allocated
    - Target R&D
    - Civil site investigation, cost estimate
    - Project Development
  - Detector : $300K slashed to ~nothing until real budget, project plan….
- FY10, FY11
  - Numbers for M&S + SWF, ranging from $2 – 4 M each for beam and detector, up to $8 – 10 M have appeared in various planning spreadsheets
  - Need to await the real budgets, stimulus allocations and approval of our project plans

Establishing a WBS

- EVMS* procedures state that the “project” is WBS 1.0
- WBS 1.0 – Long Baseline Neutrino Experiment
- Proposal (following *example* from EVMS procedures) :
  - WBS 1.0 – LBNE
    - 1.1 Project Management
    - 1.2 Neutrino Beam
    - 1.3 Near Detector
    - 1.4 Homestake Neutrino Detector (WC)
    - 1.5 NGLArTPC (Lar R&D)

**Earned Value Management System – kicks in at CD-2*

A Key Issue for organizing

- TPC = TEC + OPC
- It would be good to know what will be in the TEC and what will be in the OPC, *before* setting up the WBS
- Example : NuMI/MINOS

WBS 1.0 NuMI TEC Project — TEC

WBS 2.0 MINOS Detector

WBS 3.0 Other Project Costs
- 3.1 R&D
- 3.2 Conceptual Design
- 3.3 Cavern Construction and Outfitting

} OPC

- For now, we'll pick a model, fill it out and be willing to adjust it after getting some of the organizational responsibilities resolved.

TEC and OPC $$ are treated slightly differently in annual budget allocations : Pros and Cons to both

1.1 Project Management

- 1.1.1 LBNE Project Coordination
- 1.1.2 Neutrino Beam Project Management
- 1.1.3 Near Detector Project Management
- 1.1.4 HND (WC) Project Management
- 1.1.5 NGLArTPC Project Management

1.1.1 LBNE Project Coordination

- 1.1.1.1 LBNE Project Coordination Pre-CD-0
- *1.1.1.2 LBNE Project Coordination CD-0 – CD-1*
- 1.1.1.3 LBNE Project Coordination CD-1 – CD-2
- 1.1.1.4 LBNE Project Coordination CD-2 – CD-3
- 1.1.1.5 LBNE Project Coordination CD-3 – CD-4
- 1.1.1.6 LBNE Project Closeout

Structuring the WBS using the Project phases will help keep different “colors” of funding straight

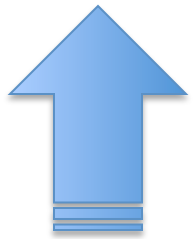
Example : Detector WBS

1.4 Homestake Neutrino Detector

- 1.4.1 Homestake Neutrino Detector Design
- 1.4.2 Homestake Neutrino Detector Construction

1.4.1 Homestake Neutrino Detector Design

- 1.4.1.1 Detector Systems and Infrastructure
  - Chamber Specification and design
  - Water Containment Vessel
  - Containment Vessel Systems
  - Magnetic Compensation
  - PMT Support Structure
  - PMT System
  - Electronics
  - Calibration
  - Online Computing/Slow Controls
  - Offline Computing
  - Simulations and Optimization
  - Water Purification
  - Installation and Integration Planning



Include ALL tasks –
Even if they are part of S4 or DUSEL S3

- 1.4.1.2 Cavity and Infrastructure

New Goal is to create the full WBS, in coordination with the cavity design effort

WBS for Beam

Technical Components
- Primary Beam
- Target Hall Components
- Decay Tunnel and Absorber
- Radiological Shielding and Control
- Infrastructure and System Integration

Civil Construction
- Site Preparation
- Tunnels and Halls
- Service Buildings and Outfitting

Neutrino Beam Instrumentation and Near Detector
- Specification and Design
- Construction
- Installation

On-going Activities for Beam Project

- DBWG at FNAL
  - Primarily NuMI "Lessons Learned"
  - Some discussions started for the new beam design requirements
- Project Establishment
  - CD-1 Plan for Pier (Gina, Dec.08)
  - FY09 Budget
    - Plans for engineering
  - MOUs, SOWs, etc.
  - CD-1 Plan for DOE (Gina,et. al.,Mar 09)

Once plan is approved,
need to transition from DBWG presentation format to real work "on-project"

Status of Resources (manpower)

Beam Design Effort

	Resource Type	Period 1	Period 2	Period 3	Working on WBS	
1	Physicist - AD	0.2	0.2	0.2	1.1.2	management
2	*Physicist - BNL*	*0.3*	*0.3*	*0.3*	*1.1.2*	*configuration opt*
3	Engineer - PPD	0.1	0.1	0.2	1.1.5	alignment
4	Physicist - AD	0.3	0.3	0.3	1.1.1	management
5	Engineer - AD	0.2			1.1.2	target
6	Physicist -TD		0.1	0.1	1.1.1	magnet inventory
7	Engineer - AD	0.1	0.2	0.2	1.1.2	target
8	Physicist - AD	0.35	0.4	0.4	1.1.2	target and horns
9	Physicist - AD		0.1	0.1	1.1.1	beam optics
10	Engineer - AD		0.1	0.1	1.1.1, 1.1.2	power supplies
11	Eng Phys - AD	0.3	0.3	0.3	1.1.1	primary transport
12	Engineer - FESS	0.1	0.3	0.3	1.2	civil
13	Engineer - PPD	0.4	0.4	0.4	1.2	civil
14	Physicist - AD	0.3	0.3	0.3	1.1.1	primary transport
15	Physicist - PPD	0.25	0.25	0.25	1.1.3, 1.1.4	configuration opt
16	Physicist - AD	0.1	0.1	0.2	1.1.2	target
17	Physicist - PPD	0.6	0.7	0.7	1.3	management
18	Eng Phys - AD		0.1	0.1	1.1.1	instrumentation
19	Physicist-ESH		0.1	0.1	1.1.4	radiation
20	Physicist-ESH	0.3	0.70	0.70	1.1.4	
21	Engineer - PPD	0.05	0.05	0.05	1.1.3	supervise engine
22	Eng - AD		0.1	0.1	1.1.1	instrumentation
23	Physicist - AD	0.1	0.3	0.4	1.1.5	integration, mana
24	Physicist - AD		0.1	0.1	1.1.1	from Mokhov gro
25	Engineer - PPD	0.1	0.2	0.2	1.1.3	from Wands grou

4 – 5 FTEs available/”working”; need essentially double, but not by getting 48 names

What can be done with this level of effort?

Defining Requirements

- Technical
  - Interfaces with other project choices
- Constructability
  - Cost
  - Schedule
- Operational
  - Safety
  - Lifetime Cost

Evaluating Alternatives

- Given an option to solve a particular problem, evaluate impacts on :
  - Technical performance – physics results
  - Long term operations
  - Cost & construction schedule
- Pick one, as the “most preferable” for one of the reasons, then compare the other options to it
- Pick a criteria for making a “choice” for moving forward to develop a preliminary cost and schedule ; other options can be used to assign a contingency

Example Alternatives for Beam Design (Mary's talk)

- Primary beam energy
  - 60 – 120 GeV
- Target Hall depth and z-location
  - Rock cover, avoiding existing facility components
- Target Hall
  - Space for component handling
- Target/Horn configurations
- Beam plug
- Decay pipe length

Remember

- Multi-dimensional, multi-parameter problem
- Needs to be solved by iteration
- Engineering studies need to be chosen carefully – they cost real money

LBNE DUSEL Detector funding to reach CD-1

		FY09 BNL			FY10 BNL			FY09-10 BNL Total	FY09-10 non-BNL (S4)			all Total
WBS	Task	FTE	type	Cost (k$)	FTE	type	Cost (k$)	(k$)	FTE	type	Cost (k$)	(k$)
1.4.1-1.4.2	PM	0.50	engineer	162.5	1.50	engineer	487.5	650.0				650.0
		0.75	admin	176.3	2.50	admin	587.5	763.8				763.8
		0.50	designer	90.0	1.50	designer	270.0	360.0				360.0
		0.25	Safety	73.8	0.50	Safety	147.5	221.3				221.3
		0.25	Manager	75.0	1.00	manager	300.0	375.0				375.0
1.4	Total		M&S	216.8		M&S	269.5	486.3				486.3
		2.25		794.3	7.00		2,062.0	2,856.3				2,856.3
4.1.1.1	Vessel	0.25	engineer	81.3	1.00	engineer	325.0	406.3				2,106.3
4.1.1.3	PMT Support				1.00	designer	180.0	180.0			1,700.0	180.0
						M&S	300.0	300.0				300.0
4.1.1.2	Magnet				0.50	engineer	162.5	162.5				162.5
					0.25	designer	45.0	45.0				45.0
4.1.1.4	PMT	0.50	engineer	162.5	0.50	engineer	162.5	325.0			900.0	1,225.0
		0.50	tech	105.0	1.00	tech	210.0	315.0				315.0
						M&S	600.0	600.0				600.0
4.1.1.5	Electronics	0.25	engineer	81.3	0.50	engineer	162.5	243.8			400.0	643.8
4.1.1.6	Calibration							0.0			500.0	500.0
4.1.1.7	Online/Slow Control							0.0			300.0	300.0
4.1.1.8	Offline/Simulation	0.25	engineer	81.3	0.50	engineer	162.5	243.8			1,600.0	1,843.8
4.1.1.10	Water System							0.0			400.0	400.0
4.1.1.11	Installation	0.25	engineer	81.3	1.00	engineer	325.0	406.3				406.3
		0.25	designer	45.0	1.00	designer	180.0	225.0				225.0
4	Total	2.25		637.5	7.25		2815.0	3,452.5			5,800.0	9,252.5
LBNE Detector	Total	4.50		1431.8	14.25		4877.0	6,308.8			5,800.0	12,108.8
S4	funding assumed										5,800.0	
non-S4	funding needed							6,308.8				
M&S												
	laptops		15	22.7		15	22.7					
	CAD software		20	30.2		5	7.6					
	travel		30	45.3		50	75.5					
	space		10	15.1		20	30.2					
	geology consult		75	90.0		100	120.0					
	Primavera/Cobra		9	13.6		9	13.6					
	total PM		159	216.8		199	269.5					
	PMTsupport					250	300.0					
	PMT shell					500	600.0					
	total		159	216.8		949	1,169.5					

Two other issues (based on observations over the past several meetings)

- Cavity Design and Construction
  - 1, 2, 3 ?
  - Cost envelops for both NSF and DOE projects
  - Extent and timing of site investigations
  - Developing Requirements at the Cavity/Interface Boundary
- Water Cerenkov – Liquid Argon
  - What happens for CD-1; what decisions need to be made
  - How does 5 + 25 planning mesh with 3x100 ?

I don't have answers or solutions – just awareness that we keep coming back to these : Good issues to be resolved through Project Coordination Group

What CD-1 is *not*

- CD-0 to CD-1 is NOT the detailed design phase
- CD-1 should be achieved with modest expenditures on engineering studies
  - Range of options needs to be explored
  - Concepts should be plausible
  - *Models* for costing should be chosen
    - It doesn't mean that is the final solution or design choice
  - Different aspects of the project planning need to proceed in parallel
    - Broad brush rather than narrow consideration of specifics

Summary

- Lots of enthusiasm at the Laboratories for this project
- Lots of pressure to produce a *plan* for the next several years
- It would then follow that there will be lots of pressure to carry out this plan
- We all need to stay coordinated and use our limited resources wisely